Claim Amendments

Please amend the claims as follows:

1. (canceled)

2. (previously presented) The device of claim 17 in which the membrane support is a single monolith.

3. (previously presented) The device of claim 17 in which the membrane support is a plurality of monolith segments.

4. (previously presented) The device of claim 17 in which the permselective membrane is a membrane with a mean pore size in the range of 10 nanometers to 1 micron and is suitable for an ultrafiltration or microfiltration process.

5. (previously presented) The device of claim 17 in which at least one of the permeate channels communicates with an annular space between the membrane element and the housing.

6. (currently amended) A crossflow membrane device for receiving a feedstock and for separating the feedstock into permeate and retentate, comprising:

a) a membrane element that receives the feedstock at a feed end face, and separates the feedstock into permeate and retentate, the membrane element comprising:

i) a membrane support containing at least one monolith of porous material defining a plurality of passageways with passageway wall surfaces, the passageways extending longitudinally from the feed end face of the monolith to a retentate end face of the monolith;

ii) a permselective membrane coating applied to the passageway wall surfaces of at least the channels through which the feedstock flows; and

iii) at least one permeate conduit formed within the monolith, the conduit containing a plurality of longitudinal permeate chambers extending substantially the

entire length of the monolith, transected proximate the feed end face by at least one permeate channel and proximate the retentate end face by at least one other permeate channel;

b) a housing assembly that contains the membrane element, the assembly comprising:

i) a housing that contains the element and is spaced from the element to define an annular space between the element and the housing;

ii) a feedstock inlet port in communication with the feed end face of the monolith, and a retentate outlet port in communication with the retentate end face of the monolith;

iii) a permeate circulation inlet port in fluid communication with the permeate channel or channels through the annular space proximate the feed end face, to allow for the introduction of circulated permeate into the permeate chambers and flow of substantially all of the circulated permeate along the length of the permeate chambers;

iv) a permeate outlet port in fluid communication with the permeate channel or channels through the annular space proximate the retentate end face, to allow for the withdrawal of the permeate from the permeate chambers;

v) a means of separating the permeate flow from the feed and retentate flows; and

vi) where at least one of the permeate channels communicates with thean annular space between the membrane device and the housing, in which the annular space is filled with a flow resistance material to reduce permeate flow through the annular space from the feed end of the device to the retentate end of the device.

7. (original) The device of claim 6 in which the flow resistance material is a constrained bed of granular material selected from the group of ceramic, glass, metallic or polymeric granular materials.

8. (original) The device of claim 6 in which the flow resistance material is a metal or plastic mesh.

9. (previously presented) The device of claim 17 in which at least one permeate port communicates with a duct at an end face of the membrane element.

10. (previously presented) The devices of claim 17 in which the cross-sectional area of the permeate chambers is reduced from the cross-sectional area of the chambers that would otherwise exist for a monolith support with a uniform and unmodified passageway structure.

11. (original) The devices of claim 10 in which the chamber cross-sectional area is reduced during the monolith support fabrication process.

12. (original) The devices of claim 10 in which the chamber cross-sectional area is reduced by plugging chambers of the monolith support during the device fabrication process.

13. (original) The devices of claim 10 in which the chamber cross-sectional area is reduced by filling chambers of the monolith support with a constrained bed of granular material during the device fabrication process.

14-16. (canceled)

17. (previously presented) A crossflow membrane device for receiving a feedstock and for separating the feedstock into permeate and retentate, comprising:

a) a membrane element that receives the feedstock at a feed end face, and separates the feedstock into permeate and retentate, the membrane element comprising:

i) a membrane support containing at least one monolith of porous material defining a plurality of passageways with passageway wall surfaces, the passageways extending longitudinally from the feed end face of the monolith to a retentate end face of the monolith;

ii) a permselective membrane coating applied to the passageway wall surfaces of at least the channels through which the feedstock flows; and

iii) at least one permeate conduit formed within the monolith, the conduit containing a plurality of longitudinal permeate chambers extending substantially the entire length of the monolith, transected proximate the feed end face by at least one permeate channel and proximate the retentate end face by at least one other permeate channel;

b) a housing assembly that contains the membrane element, the assembly comprising:

i) a housing that contains the element;

ii) a feedstock inlet port in communication with the feed end face of the monolith, and a retentate outlet port in communication with the retentate end face of the monolith;

iii) a permeate circulation inlet port in fluid communication with the permeate channel or channels proximate the feed end face, to allow for the introduction of circulated permeate into the permeate chambers and flow of substantially all of the circulated permeate along the length of the permeate chambers;

iv) a permeate outlet port in fluid communication with the permeate channel or channels proximate the retentate end face, to allow for the withdrawal of the permeate from the permeate chambers, where the permeate circulation input port and the permeate outlet port are configured such that substantially all of the circulated permeate flows substantially through the entire length of the permeate chambers without encountering an egress to an external surface of the membrane element; and

v) a means of separating the permeate flow from the feed and retentate flows.

18. (previously presented) A method of separating a feedstock into permeate and retentate with a crossflow membrane device that receives feedstock at a feed end face, comprising:

a) providing a membrane element that receives the feedstock at a feed end face, and separates the feedstock into permeate and retentate, the membrane element comprising:

i) a membrane support containing at least one monolith of porous material defining a plurality of passageways with passageway wall surfaces, the passageways extending longitudinally from the feed end face of the monolith to a retentate end face of the monolith;

ii) a permselective membrane coating applied to the passageway wall surfaces of at least the channels through which the feedstock flows; and

iii) at least one permeate conduit formed within the monolith, the conduit containing a plurality of longitudinal permeate chambers extending substantially the entire length of the monolith, transected proximate the feed end face by at least one permeate channel and proximate the retentate end face by at least one other permeate channel;

b) providing a housing assembly that contains the membrane element, the assembly comprising:

i) a housing that contains the element;

ii) a feedstock inlet port in communication with the feed end face of the monolith, and a retentate outlet port in communication with the retentate end face of the monolith;

iii) a permeate circulation inlet port in fluid communication with the permeate channel or channels proximate the feed end face, to allow for the introduction of

circulated permeate into the permeate chambers and flow of substantially all of the circulated permeate along the length of the permeate chambers;

iv) a permeate outlet port in fluid communication with the permeate channel or channels proximate the retentate end face, to allow for the withdrawal of the permeate from the permeate chambers, where the permeate circulation input port and the permeate outlet port are configured such that substantially all of the circulated permeate flows substantially through the entire length of the permeate chambers without encountering an egress to an external surface of the membrane element; and

v) a means of separating the permeate flows from the feed and retentate flows;

c) introducing a feedstock and withdrawing retentate; and

d) circulating a portion of the permeate through the permeate conduit co-currently with the feedstock flow, to create a decreasing permeate pressure within the permeate conduit from the feed end of the membrane device to the retentate end of the device.